

direction of the induced currents is reversed. The observation may be repeated any number of times; but no effect is produced unless an interval of from ten to twenty seconds has elapsed since the preceding irritation.

h. If the part of the concave surface of the leaf which is nearest the petiole is excited, whether electrically or mechanically, the swing to the right (negative variation) is always preceded by a momentary jerk of the needle to the left, *i. e.* in the direction of the deflection due to the normal leaf-current; if any other part of the concave surface is irritated, this does not take place.

i. Whether the leaf is excited mechanically or electrically, an interval of from a quarter to a third of a second intervenes between the act of irritation and the negative variation.

#### MISCELLANEOUS.

*Observations on the Existence of certain Relations between the Mode of Coloration of Birds and their Geographical Distribution.* By M. A. MILNE-EDWARDS.

IN carrying on my researches on the geographical distribution of animals in southern regions, I have been struck with certain relations which seem to exist between the parts of the globe inhabited by birds and the mode of coloration of those animals; and wishing to know the degree of importance that ought to be ascribed to this observation, I have tried to examine more carefully than had previously been done what may be called the geographical distribution of colours in birds. In fact this investigation seemed to me capable of throwing some light on the influence which local biological conditions may exert upon the secondary zoological characters of species and races. To furnish significant results it ought to bear principally upon the natural groups which have a very wide geographical distribution; and in order that it may have the necessary degree of precision, it ought to be founded upon the chromatic analysis of the plumage and the comparison of its colours with well-defined normals. Without the aid furnished by the chromatic circles, for which science and the arts are indebted to M. Chevreul, it would have been difficult for me to appreciate thoroughly the tones and shades which I had to take into account, and still more difficult to formulate clearly the results furnished by observation; but by means of these circles this labour has been remarkably facilitated.

In a first series of investigations I attended specially to various degrees of melanism; and in order to judge of the relative influence of black upon the plumage of birds inhabiting various geographical regions, I took into account not only the extent of the parts of the tegumentary system which are tinted in that manner, but also the degree in which the other colours may be dulled or modified in their tone by mixture with black in various proportions.

Birds with black plumage are found in nearly all parts of the globe ; but in certain families, of which the geographical extension is very wide, the tendency to melanism is scarcely shown except in the southern hemisphere, and more particularly in the oceanic region which includes New Zealand, Papuasias, Madagascar, and the intermediate countries. A remarkable example of this coincidence between the mode of coloration of birds and their distribution on the surface of the globe is furnished by the family of the swans. In the northern hemisphere this family has numerous representatives whose plumage is entirely white ; in the southern hemisphere this is not the case, and a more or less considerable portion becomes intensely black. Thus the Australian swan is almost entirely black ; the coscoroba, or *Cygnus anatooides*, which is confined to the Fuegian archipelago and neighbouring countries in South America, has some of the wing-feathers black, and it is by this character alone that it differs from the Chinese coscoroba (*C. Davidii*) ; lastly, in the swan of Chili, the head and neck are jet-black, whilst the rest of the body is pure white. These are the only species of swans which live in the southern hemisphere.

These peculiarities would have but little interest if they were isolated : but this is not the case ; and the examination of the geographical distribution of the colours of the parrots furnishes us with still more manifest proofs of the tendency to melanism in the vast oceanic region which includes New Zealand, Papuasias, and the intermediate lands.

Black or nearly black parrots are not met with in America, Asia, or Africa (except on the borders of the Mozambique channel), but they are not uncommon in the southern region contained within the limits already mentioned ; and it is there especially that we find the species or local races in which the plumage only presents strongly toned-down tints. Thus, in New Zealand and the adjacent islands, these birds, instead of presenting bright colours, are more or less tinged with black. The Nestors, for example, have dull brown plumage ; the larger feathers of the wings and tail, wherever they are exposed to the light, are almost uniformly of a brown tint, resembling that produced by a mixture of nine parts of black with one part of orange-red ; on the shoulders, the greater part of the back, the head, and the breast the feathers have a brown border of a still deeper tint ; and in the rest of their surface similar tints are mitigated by white, so as to become more or less greyish ; and it is almost solely on the tail-coverts and the inner surface of the wings and on the corresponding portion of the flanks, which are not habitually exposed to the light, that an orange-red colour but slightly toned down shows itself here and there.

The *Strigops* or night-parrots of New Zealand also in great part owe their peculiar aspect to another kind of melanism, affecting a greenish ground, and mixed with parts modified by albinism. This yellowish green, which belongs to Nos. 3 and 4 of the chromatic circles, is far from being pure ; it is toned down by about  $\frac{3}{10}$  or  $\frac{4}{10}$  of black, and is interrupted above by spots and irregular bands of

nearly pure black and also by whitish streaks, whilst below and on the sides of the head the spots are due almost entirely to albinism. These mixtures, in which black plays a great part, produce a dull and speckled plumage which, up to a certain point, resembles that of our owls.

The tendency to melanism occurs also in the parroquets of New Zealand. These birds belong to the group of the Platycerci of which ornithologists have formed the genus *Cyanorhamphus*. Its plumage is of a dull green; a little pure red or yellow is still to be seen on the forehead or on some other very restricted parts; all the upper part of the body of the bird is of a yellowish-green colour much toned down with black, and below a similar but lighter tint spreads almost uniformly. In *Cyanorhamphus alpinus* the dominant coloration nearly corresponds to the yellowish green of the gamut No. 4, toned down by  $\frac{5}{10}$  of black; in *C. novæ-zelandiæ*, the yellowish green belongs to the gamut No. 2 and to that No. 3, but it is dulled by  $\frac{6}{10}$  of black; lastly, in *C. auriceps* the general tint of the plumage agrees with the yellowish green No. 1, toned down by  $\frac{6}{10}$  of black over the whole upper surface of the body.

The islands of the great Indo-Pacific Ocean which are near Africa resemble New Zealand as regards the coloration of the plumage of their parrots. Thus in Madagascar, in the Mauritius to the east, and in the Seychelles and Comoro islands towards the north, and even on some parts of the neighbouring shore of Africa, we find several black species of parrots belonging to the genus *Coracopsis*.

In Australia the *Calyptorhynchi* abound; and the whole of their plumage is of an intense black colour or softened with white. Many of the Australian parroquets have pure colours in the same degree as those of America; but in many of these birds the tendency to melanism makes its appearance in various parts of the body, sometimes by the existence of a uniform tint very much toned down, and sometimes by the whole basal part of the feathers being invaded by black, which only bears near the margins a more or less narrow band of red, yellow, green, or blue.

In the memoir, of which I could only give a short abstract here, I review several other ornithological families which have furnished analogous facts and show the same tendencies—for example, the families of the Kingfishers, *Rallidæ*, and Ducks. But I have no space to speak of them here; and the facts which I have indicated suffice to show that in the southern Indo-Pacific region the ornithological types which elsewhere are clothed with brilliant colours, generally have tints toned down with black or weakened by a tendency to albinism.—*Comptes Rendus*, December 29, 1873, pp. 1551–1554.

*On the Genus Callignathus and on Kogia Floweri of Dr. Gill.*

By Dr. J. E. GRAY, F.R.S. &c.

Dr. Theodore Gill, in a semipopular paper on "Sperm-whales giant and pigmy," in the 'American Naturalist,' 1871, iv. p. 725, gives a general account of these animals, and proposes a new species.